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MUTSCHLER, BRIAN L

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/609,347	Applicant(s) CHEUNG ET AL.	
	Examiner Brian L. Mutschler	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 19-67* is/are pending in the application.

4a) Of the above claim(s) *57-62* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,19-56 and 63-67* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Comments

1. This action is in response to Applicant's amendment filed March 7, 2003. Claims 1-11 and 19-67 are pending with claims 19 and 20 amended and claims 48-67 newly added.

2. The objection to claims 19 and 20 as being of improper dependent form has been overcome by Applicant's amendment.

3. In light of Applicant's response, the rejections of claims 1-11 and 19-47 under 35 U.S.C. 103(a) as being unpatentable over Maydan et al. as the primary reference have been withdrawn. While Maydan et al. disclose an integrated system for depositing layers on integrated circuits, the motivation for on skilled in the art to use the system of Maydan et al. for electrochemical deposition has not been clearly set forth. However, the teachings of Maydan et al. regarding the general aspects and features used in integrated deposition systems are relevant to the endeavor of depositing coatings on integrated circuits or other substrates. Consequently, the reference of Maydan et al. has been applied in the new rejections as a teaching reference.

Election/Restrictions

4. Newly submitted claims 57-62 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Claims 57-62 are related to a method for electrochemically processing a substrate and recite specific operating parameters for such a method including

annealing the substrate at a temperature between about 200°C and about 450°C for about 30 seconds to about 30 minutes. The method also recites steps that must be followed in a specific sequence. Therefore, claims 57-62 are independent and distinct from the invention originally claimed because the apparatus originally claimed can be used at different temperatures and to perform a method comprising a different sequence of steps.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 57-62 have been withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

5. Claims 6-8, 30, 38, 45, 48, 51, 52, 63 and 66 are objected to because of the following informalities:

a. In claim 6 at line 2, please change "the chamber" to --the thermal anneal chamber-- to maintain consistent claim language;

b. In claim 7 at line 2, please change "the chamber" to --the thermal anneal chamber-- to maintain consistent claim language;

c. In claim 8 at line 2-3, please change "the chamber" to --the thermal anneal chamber-- to maintain consistent claim language;

d. In claim 30 at line 2, please change "each electrochemical deposition cell" to --each of the electrochemical deposition cells-- to maintain consistent claim language;

e. In claim 38 at line 2, please change "a mainframe wafer transfer robots" to --a mainframe wafer transfer robot--;

f. In claim 45 at line 2, please change "a mainframe wafer transfer robots" to --a mainframe wafer transfer robot--;

g. In claim 48 at line 2, please delete the word "is" following "gas outlet";

h. In claim 51 at line 1, please insert --the-- before "substrate" to identify the feature which was previously recited;

i. In claim 52 at line 8, please change "the means for transferring" to --means for transferring substrates-- to maintain consistent claim language;

j. In claim 63 at line 3, please change "a mainframe support" to --the mainframe support-- to identify the feature which was already recited; and

k. In claim 66 at line 3, please change "2" to --two--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 51 and 65 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 51 recites the limitation "wherein the substrate rinse and dry station separates wet processing components of the system from dry processing components of the system". While the instant disclosure does detail a substrate rinse and dry station and also discloses components comprising wet processes and dry processes, the disclosure does not appear to identify the concept comprising the claimed limitation wherein the wet processes are separated by dry processes. Thus, claim 51 raises the issue of new matter.

Claim 65 recites the limitation comprising "an edge bead removal cell". On page 4 beginning at line 25, the instant specification states, "It would be desirable for the system to prevent and/or remove unwanted edge and backside deposition". On page 11 beginning at line 7, the instant specification states, "The invention could also be used to remove the unwanted deposits along the edge of the substrate to create an edge exclusion zone". While the instant disclosure does identify the desirability to remove edge deposits, the disclosure does not appear to identify the use of an "edge bead removal cell". The chamber referred to in the instant disclosure regarding the removal of edge deposits is the spin-rinse-dry (SRD) module **238**, which uses a dissolving fluid and a rinsing fluid (see page 10 of the instant specification). Therefore, the instant specification is not seen to disclose an "edge bead removal cell" or a system comprising

both SRD modules and a cell for removing edge deposits, as recited by the limitations of claim 65 and the limitations of the claim from which it depends. Thus, the limitations of claim 65 raise the issue of new matter.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 31, 34, 39, 40, 43 and 52-56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 31 recites the limitation "at least one of the mainframe wafer transfer robots" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Claim 21, from which the claim depends, recites a single "mainframe wafer transfer robot" in line 2. It is suggested that the phrase be changed to --the mainframe wafer transfer robot--.

Claim 34 recites the limitation "wherein the electrolyte replenishing system" in line 1. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the claim be amended to depend from claim 33, which introduces the electrolyte replenishing system.

Claim 39 recites the limitations "the one or more loading station robots" in lines 1-2 and "the one or more cassette receiving areas" in line 2. There is insufficient antecedent basis for these limitations in the claim. Since "the one or more loading station robots" and a loading station in general are first introduced in

claim 44, it was assumed that claim 39 should actually depend from claim 44 instead of claim 38. It is suggested that the phrase "the one or more cassette receiving areas" be changed to --one or more cassette receiving areas--.

Claim 40 recites the limitations "the one or more loading station robots" in lines 1-2 and "the one or more cassette receiving areas" in line 2. There is insufficient antecedent basis for these limitations in the claim. Since "the one or more loading station robots" and a loading station in general are first introduced in claim 44, it was assumed that claim 40 should actually depend from claim 44 instead of claim 38. It is suggested that the phrase "the one or more cassette receiving areas" be changed to --one or more cassette receiving areas--.

Claim 43 recites the limitation "the loading station robots" in line 3. There is insufficient antecedent basis for this limitation in the claim. Since "the one or more loading station robots" and a loading station in general are first introduced in claim 44, it was assumed that claim 42, from which claim 43 depends, should actually depend from claim 44 instead of claim 38. Furthermore, the phrase "the loading station robots" should be changed to --the one or more loading station robots-- to maintain consistent claim language.

Claim 52 recites the limitation "the at least one substrate transfer robot" in lines 7-8. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the phrase either be changed to --the means for transferring substrates-- or the limitations recited in claim 56 be incorporated into claim 52 to provide antecedent basis for the limitation. The same applies to dependent claims 53-56.

Claim 55 recites the limitation "the substrate loading chamber" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the phrase be changed to --the substrate loading station--.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 21-28, 31, 36, 38-40 and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Hongo et al. (U.S. Pat. No. 6,294,059).

Regarding claims 21 and 38, Hongo et al. disclose an electro-chemical deposition system arranged in a unitary (mainframe) arrangement comprising a plurality of treatment stations (fig. 1, 3, 5-8, 10, 11). In an embodiment shown in Figure 7, the system comprises a mainframe having a mainframe transfer robot disposed therein, a loading station **20** serviced by another transfer robot **43**, one or more processing stations comprising a plurality of plating cells **32**, and post-deposition treatment chambers **40** in the form of cleaning and drying units **41** and **42** (col. 9, line 43 to col. 12, line 23). In another embodiment shown in Figure 11, the system comprises a mainframe **110** having a mainframe wafer transfer robot **162** disposed therein, a loading

station **167** having a transfer unit with a grip hand (loading station robot) **161**, one or more processing stations comprising a plurality of plating cells (electrochemical deposition cells) **119** and a plurality of post deposition treatment chambers in the form of water cleaning and drying units **160** (col. 12, line 24 to col. 14, line 16).

Regarding claims 22, 39 and 40, Hongo et al. disclose the use of cassette receiving areas for accommodating the wafers and unloading and loading units **20a** and **20b** which orient the wafers (col. 10, lines 17-20).

Regarding claims 23, 25, 36 and 38, the post deposition treatment chambers **40** comprise units to clean the wafers with water and to spin and dry the wafers (col. 10, lines 20-31). The units are disposed in connection with the mainframe and the loading station **20** (fig. 7).

Regarding claims 23, 24, 39 and 40, the transfer robot **43** is capable of transferring the wafers from the loading station to the cassette receiving areas and the post deposition treatment areas including the cleaning units and the drying units (fig. 7; col. 10, lines 20-31).

Regarding claims 26-28, the system shown in Figure 11, comprises a pretreatment cell **118** and three plating cells **119** disposed on each of two opposing sides, wherein the mainframe wafer transfer robot **162** is disposed between the two sides (fig. 11; col. 12, lines 35-45).

Regarding claim 31, the transfer robot **162** is a six-axis robot capable of moving in the direction about six different axes, further comprising a grip hand **164** and capable

of transferring a wafer from a face-up position to a face-down position (fig. 12; col. 12, lines 49-55).

Regarding claim 44, the mainframe further comprises an additional robot **43** capable of servicing the loading area **20** and the cleaning and drying units (fig. 7).

Since Hongo et al. teach all of the structural limitations recited in the instant claims, the reference is deemed to be anticipatory.

12. Claims 38, 52, 53 and 56 are rejected under 35 U.S.C. 102(e) as being anticipated by Ritzdorf et al. (U.S. Pat. No. 6,508,920). (Note: U.S. Pat. No. 6,508,920 is a continuation of U.S. Pat. App. No. 09/018,783 filed February 4, 1998, as stated in col. 1, lines 6-17).

Regarding claims 38 and 52, Ritzdorf et al. disclose an integrated system for forming and annealing microelectronic devices comprising a mainframe with a transfer robot having robot arms **620**, one or more processing stations having one or more electroplating stations, one or more rinsing/drying stations (cleaning stations) and a post deposition treatment chamber comprising an annealing station (fig. 16 and 17; col. 13 line 58 to col. 14, line 15). As shown in Figure 17, the system can also comprise a separate robot **640** for servicing the annealing station **630** (col. 14, lines 4-15).

Regarding claim 53, Ritzdorf et al. disclose an annealing chamber, which could be "rapid" depending upon the materials for which the apparatus is being used. The term "rapid" is a relative term and can be applied in many different ways according to

the reference to which it is being compared, i.e., the annealing chamber of Ritzdorf et al. could be "rapid" compared to an annealing chamber operated at room temperature.

Regarding claim 56, the means for transferring substrate comprises a plurality of robot arms **620** and an additional robot **640** (fig. 16 and 17; col. 13, line 58 to col. 14, line 15).

Since Ritzdorf et al. teach the structural limitations recited in the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ritzdorf et al. (U.S. Pat. No. 6,508,920) in view of Hongo et al. (U.S. Pat. No. 6,294,059).

Ritzdorf et al. disclose a system having the limitations recited in claims 28, 52, 53 and 56 of the instant invention, as explained above in section 12.

Regarding claims 1, 21, 32, 45 and 63, Ritzdorf et al. disclose an integrated system for forming and annealing microelectronic devices comprising a mainframe with a transfer robot having robot arms **620**, one or more processing stations having one or more electroplating stations, one or more rinsing/drying stations (cleaning stations) and

a post deposition treatment chamber comprising an annealing station (fig. 16 and 17; col. 13 line 58 to col. 14, line 15). As shown in Figure 17, the system can also comprise a separate robot **640** for servicing the annealing station **630** (col. 14, lines 4-15).

Regarding claims 2, 3, 19, 32 and 49, the annealing chamber of Ritzdorf et al. comprises either a radiant heat source or a heating element **565**, which is shown in the form of a resistive element in a plate (fig. 14; col. 12, lines 54-65). The term "rapid" is a relative term and can be applied in many different ways according to the reference to which it is being compared, i.e., the annealing chamber of Ritzdorf et al. could be "rapid" compared to an annealing chamber operated at room temperature. Regarding the phrase "atmospheric pressure heater plate" in claim 3, the limitation "atmospheric pressure" is a method of using the product. The heating mechanisms shown by Ritzdorf et al. would be expected to perform at an atmospheric pressure.

Regarding claim 4, the flow rate of the coolant liquid used to control the temperature in the annealing chamber is one of the components controlled by a controller **580** in the system (col. 13, lines 20-22).

Regarding claims 11, 23, 25, 29, 36, 50 and 63, Ritzdorf et al. disclose the use of rinsing and drying stations (col. 13, lines 59-62).

Regarding claims 26-28 and 45, Ritzdorf et al. disclose one or more electroplating systems comprising the processing stations **610** in Figures 16 and 17, which each show four processing stations **610** on both of two opposing sides, wherein the transfer robot **620** positioned between the two sides (col. 13, lines 58-65).

Regarding claims 29 and 30, Ritzdorf discloses that the system has one or more robotic arms **620** (fig. 16 and 17; col. 13, line 66 to col. 14, line 3).

Regarding claim 49, the annealing chamber in the system of Ritzdorf et al. further comprises a heat sink (cooling plate) **540** having a coolant flowing therethrough to cool the substrate (fig. 14; col. 13, lines 16-20).

The system disclosed by Ritzdorf et al. differs from the instant invention because Ritzdorf et al. do not disclose the following:

a. A loading station disposed in connection with the mainframe, as recited in claims 1, 21, 44, 45, 54 and 63;

b. One or more wafer cassette receiving areas, as recited in claims 9, 21, 39 and 40;

c. One or more loading station wafer transfer robots, as recited in claims 9, 21, 39, 40, 44 and 45;

d. A spin-rinse-dry station disposed on the mainframe, as recited in claims 11, 23, 25, 29, 36, 50 and 63;

e. A wafer orientor, as recited in claim 22;

f. At least two electrochemical deposition cells positioned on both of two opposing sides, as recited in claims 26 and 27;

g. The mainframe comprises one robot arm for each of the electrochemical deposition cells, as recited in claim 30;

h. The mainframe wafer transfer robot facilitates transfer of a wafer from a face-up position to a face-down position, as recited in claim 31;

i. A pass-through cassette disposed above the cleaning modules, as recited in claims 42 and 46;

j. Two or more processing stations each having two or more electrochemical deposition cells, two or more cleaning modules, and two or more post deposition treatment chambers, as recited in claim 45;

k. An edge bead removal cell, as recited in claim 65; and

l. The various positioning and intended method of use limitations recited in the instant claims.

Regarding claims 1, 9, 21, 39, 44, 45, 54 and 63, Hongo et al. discloses a similar integrated system for electroplating integrated circuits. In an embodiment shown in Figure 7, the system comprises a mainframe having a mainframe transfer robot disposed therein, a loading station **20** serviced by another transfer robot **43**, one or more processing stations comprising a plurality of plating cells **32**, and post-deposition treatment chambers **40** in the form of cleaning and drying units **41** and **42** (col. 9, line 43 to col. 12, line 23). In another embodiment shown in Figure 11, the system comprises a mainframe **110** having a mainframe wafer transfer robot **162** disposed therein, a loading station **167** having a transfer unit with a grip hand (loading station robot) **161**, one or more processing stations comprising a plurality of plating cells (electrochemical deposition cells) **119** and a plurality of post deposition treatment chambers in the form of water cleaning and drying units **160** (col. 12, line 24 to col. 14, line 16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the integrated system of Ritzdorf et al. to use a loading station and a loading station robot as taught by Hongo et al. because using a loading station and a loading station robot automates the loading and unloading of the wafers in the system, increasing the efficiency of the apparatus.

Regarding claims 9, 21, 22, 39 and 40, Hongo et al. also disclose the use of cassette receiving areas for accommodating the wafers and unloading and loading units **20a** and **20b** which orient the wafers (fig. 7; col. 10, lines 17-20). Cassettes are known in the art of wafer processing to hold a plurality of wafers for processing.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Ritzdorf et al. to use one or more wafer cassette receiving areas as taught by Hongo et al. because the use of cassettes allows a plurality of wafers to be held for processing, increasing the efficiency of the operation.

Regarding claims 11, 23, 25, 29, 36, 50 and 63, Ritzdorf et al. disclose the use of rinsing and drying units to clean and dry the plated wafers (col. 13, lines 59-62). Hongo et al. also disclose, "spinning a semiconductor wafer at a high speed to dehydrate and dry it" (col. 10, lines 27-28).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the rinsing and drying unit of Ritzdorf et al. with a

rinse-spin-dry unit as taught by Hongo et al. because spinning helps to dehydrate and dry the wafers.

Regarding claims 26, 27 and 45, Ritzdorf et al. disclose the use of one or more electroplating systems comprising the processing stations **610** in Figures 16 and 17, which each show four processing stations **610** on both of two opposing sides, wherein the transfer robot **620** positioned between the two sides (col. 13, lines 58-65). Hongo et al. disclose a system shown in Figure 11, which comprises a pretreatment cell **118** and three plating cells **119** disposed on each of two opposing sides, wherein the mainframe wafer transfer robot **162** is disposed between the two sides (fig. 11; col. 12, lines 35-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used multiple electrochemical deposition cells in the system of Ritzdorf et al. to use at least two electrochemical deposition cells on each of two opposing sides as shown by Hongo et al. because using multiple deposition cells increases the number of wafers that can be plated at one time.

Regarding claim 30, Ritzdorf et al. disclose that the transfer mechanism comprises one or more robotic arms **620**and shows the use of a system with two arms (fig. 16 and 17; col. 13, line 66 to col. 14, line 3.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Ritzdorf et al. to use an arm for each electrochemical deposition cell because using more arms increases the number of

wafers that can be transferred at one time as well as decreases the average time required to replace a wafer in a plating cell.

Regarding claim 31, Hongo et al. disclose a transfer robot **162** that is a six-axis robot capable of moving in the direction about six different axes, further comprising a grip hand **164** and capable of transferring a wafer from a face-up position to a face-down position (fig. 12; col. 12, lines 49-55).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the transfer robot in the system of Ritzdorf et al. to use a robot as taught by Hongo et al. because a six-axis robot allows a greater degree of freedom and the ability to more accurately position the robot arm.

Regarding claims 42 and 46, Hongo et al. disclose the use of cassettes for transporting the wafers and also discloses a partition **21** for separating the loading and unloading area **20** and the cleaning and drying area **40** and a partition **23** disposed between the cleaning and drying area **40** and the plating area **30** (col. 9, lines 43-67). The partitions **21** and **23** have passages for transferring the wafers between the different stations and also comprise shutters **22** and **24** for opening and closing the passages between the stations (col. 9, lines 57-67). This passage system is equivalent to the pass-through cassette system disclosed and claimed in the instant claims, and it allows the different stations to be independently supplied with discharge air (col. 9, lines 57-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Ritzdorf et al. to use a pass-through system as taught by Hongo et al. because the pass-through system allows the separation of the different stations and the ability to independently supply the stations with discharge air.

Regarding claim 65, Hongo et al. disclose the use of a chemical mechanical polishing unit to remove excess plated material from the wafers (col. 12, lines 13-18). The chemical mechanical polishing unit provides the equivalent function as the claimed edge bead removal cell.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Ritzdorf et al. to use a unit to remove excess material as taught by Hongo et al. because removing excess plated material ensures the proper operation of the plated devices.

Regarding the various relative positions and the intended methods of using the various features claimed in the instant invention, Ritzdorf et al. and Hongo et al. disclose ability to vary the components and arrangements of the system. Hongo et al. disclose both rectangular and circular arrangements and also state, "Any of various other suitable area and unit layouts may be employed insofar as a dry semiconductor wafer can be loaded into the substrate plating apparatus, and a plated semiconductor

wafer can be cleaned and dried, and thereafter unloaded from the substrate plating apparatus" (fig. 1, 3, 5-8, 10 and 11; col. 12, lines 18-23).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the arrangements of the components in the system of Ritzdorf et al. because Hongo et al. teach that "any of carious other suitable area and unit layouts may be employed" to achieve equivalent results.

15. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ritzdorf et al. (U.S. Pat. No. 6,508,920) in view of Hongo et al. (U.S. Pat. No. 6,294,059), as applied above to claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67, and further in view of Davis et al. (U.S. Pat. No. 4,816,098).

Ritzdorf et al. and Hongo et al. describe a system having the limitations recited in claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67 of the instant invention, as explained above in section 14.

The system described by Ritzdorf et al. and Hongo et al. differs from the instant invention because they do not disclose the following:

a. A gas inlet to introduce gas into the thermal anneal chamber, as recited in claim 5;

b. The controller is adapted to control the gas inlet, as recited in claim 6;

c. The gas inlet is connected to a nitrogen gas source, as recited in claim 7;

d. The gas inlet is connected to a nitrogen gas source and a hydrogen gas source, as recited in claim 8; and

e. The intended method of use limitations recited in the instant claims.

Regarding claims 5, 7 and 8, Davis et al. disclose an integrated system comprising a plurality of process modules **104** serviced by transfer robots **28** and **106** and also comprising an annealing chamber (fig. 5A; col. 21, lines 3-44 and col. 25, line 14 to col. 26, line 16). The device comprises inlets and outlets for evacuating and purging the chambers with gas such as nitrogen and argon (col. 25, line 14 to col. 26, lines 16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system described by Ritzdorf et al. and Hongo et al. to use a gas inlet as taught by Davis et al. because using a gas inlet allows for the purging of contaminants from the chambers and the introduction of purge gases such as nitrogen into the chamber.

Regarding the limitations of claim 6, wherein the controller is adapted to control the gas inlet, Davis et al. discloses that a control system **562** "supplies the necessary control for [process] modules **554**, assembly **558** and chambers **565** and **556**" (col. 23, lines 51-57).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the controller in the system described by Ritzdorf et al. and Hongo et al. to use a controller capable of performing all of the control functions required by the system as taught by Davis et al. because using a control

system capable of controlling all of the functions of the system allows for more efficient control.

Regarding the intended method of use limitations, such as the desired concentration of gases and the types of gases, the limitations do not positively limit the structure of the device, but are related to the method of using the device. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) (see MPEP § 2114)

16. Claims 33-35, 41 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ritzdorf et al. (U.S. Pat. No. 6,508,920) in view of Hongo et al. (U.S. Pat. No. 6,294,059), as applied above to claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67, and further in view of Polan et al. (U.S. Pat. No. 4,568,431).

Ritzdorf et al. and Hongo et al. describe a system having the limitations recited in claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67 of the instant invention, as explained above in section 14.

The system described by Ritzdorf et al. and Hongo et al. differs from the instant invention because they do not disclose the following:

a. An electrolyte replenishing system, as recited in claims 33 and 41;

b. The electrolyte replenishing system comprises one or more filter, one or more chemical analyzers, and one or more chemical storage tanks, as recited in claim 34;

c. The one or more chemical storage tanks provides chemicals to the spin-rinse-dry modules, as recited in claim 35; and

d. A chemical replenishment system that monitors and doses electrolyte to the electrochemical plating cells, as recited in claim 66.

Regarding claims 33, 41 and 66, Polan et al. disclose an electroplating system comprising a solution filtration/replenishment loop having a plurality of chemical storage tanks, at least one filter and solution sensing (analyzing) means which are used to control the system (col. 3, lines 10-28). The replenishing system may be controlled either manually or automatically in response to sensed conditions of the solution (col. 10, lines 38-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system described by Ritzdorf et al. and Hongo et al. to use a chemical replenishment system as taught by Polan et al. because the replenishment system removes contaminants from the solution, which would provide a more uniform product.

Regarding the limitation of claim 35, wherein the one or more chemical storage tanks provides chemicals to the spin-rinse-dry modules, the system of Polan et al.

teaches the use of conduits to the process cells, which would be capable of providing the spin-rinse-dry cells with chemicals.

17. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ritzdorf et al. (U.S. Pat. No. 6,508,920) in view of Hongo et al. (U.S. Pat. No. 6,294,059), as applied above to claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67, and further in view of Woodruff et al. (U.S. Pat. No. 6,309,520).

Ritzdorf et al. and Hongo et al. describe a system having the limitations recited in claims 1-4, 9-11, 19-32, 36, 37, 39, 40, 42-47, 49-51, 54, 55, 63-65 and 67 of the instant invention, as explained above in section 14.

The system described by Ritzdorf et al. and Hongo et al. differs from the instant invention because they do not disclose the thermal anneal chamber having at least one gas outlet and in fluid communication with a gas source.

Woodruff et al. disclose an apparatus for electroplating substrates using an integrated system, as shown in Figures 47-49. Woodruff et al. also teach that annealing the deposited layer in a vacuum can improve the adhesion of the deposited layer (col. 3, lines 53-62). To perform the annealing under a vacuum, gas outlets are used to evacuate the gases.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified annealing chamber in the system described by Ritzdorf et al. and Hongo et al. to use a vacuum source as taught by Woodruff et al. because using a vacuum source improves the adhesion of the deposited layer.

Double Patenting

18. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

19. Claims 1, 4, 11, 19, 20, 38, 41, 50-56 and 63-67 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 6,267,853. Although the conflicting claims are not identical, they are not patentably distinct from each other because they claim the same structural limitations.

Regarding claims 1, 38, 52, 54, 56, 63 and 65, US '853 claims an electrochemical deposition system comprising a mainframe having a wafer transfer robot, a loading station, one or more processing cells having an attached electrolyte supply, post deposition treatment chambers in the form of cleaning modules (spin-rinse-dry station), edge bead removal and thermal anneal chamber (claims 1 and 3-5).

Regarding claim 4, the system further comprises a system controller for controlling an electrochemical deposition process (claim 3).

Regarding claims 11, 50 and 63, the system comprises a spin-rinse-dry station (claim 4).

Regarding claims 19 and 53, the word "rapid" is a relative term, and the thermal anneal chamber of US '853 would be considered "rapid" in comparison to a room temperature annealing chamber.

Regarding claims 20, 55 and 64, the thermal anneal chamber is disposed in connection with the loading station (claim 5).

Regarding claims 41 and 66, US '853 claims an electrolyte supply connected to the processing cells (claim 1).

The claims of US '853 differ from the instant invention because US '853 does not claim that the processing cells are electrochemical deposition cells, as recited in claims 1, 38, 52 and 63, and some of the positional relationships between some of the structural features, such as the substrate rinse and dry station positioned to separate the substrate loading station from the mainframe, as recited in claim 50, and the substrate rinse and dry station separates wet processing components of the system from dry processing components of the system, as recited in claim 51.

Regarding the difference between the type of the process cells, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used the processing cells claimed by US '853 because the system is an "electro-chemical deposition system" and the processing cells are supplied with electrolyte, which is used in electrochemical deposition cells.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the position of the stations claimed in US '853 because the rearrangement of structural parts merely creates a functionally equivalent device.

20. Claims 1-4 and 52-56 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 6,258,220 in view of Ritzdorf et al. (U.S. Pat. No. 6,508,920).

Regarding claims 1, 52, 54 and 56, US '220 claims an electrochemical deposition system comprising a mainframe with a mainframe wafer transfer robot, a loading station, and one or more processing cells provided with electrolyte from an electrolyte supply (claims 1-3). The processing cell is fed with an electrolyte is connected to an anode and a cathode (claim 3), which makes the process cell capable of being used as an electrochemical deposition cell.

The system claimed by US '220 differs from the instant invention because US '220 does not claim the following:

a. An annealing chamber, as recited in claims 1 and 52;

b. The thermal anneal chamber comprises a heater plate, as recited in claims 2 and 3; and

c. A system controller to control at least one of the components of the system, as recited in claim 4.

Regarding claims 1, 2, 3, 52 and 55, the annealing chamber of Ritzdorf et al. comprises either a radiant heat source or a heating element **565**, which is shown in the form of a resistive element in a plate (fig. 14; col. 12, lines 54-65). The term "rapid" is a relative term and can be applied in many different ways according to the reference to which it is being compared, i.e., the annealing chamber of Ritzdorf et al. could be "rapid" compared to an annealing chamber operated at room temperature. Regarding the phrase "atmospheric pressure heater plate" in claim 3, the limitation "atmospheric pressure" is a method of using the product. The heating mechanisms shown by Ritzdorf et al. would be expected to perform at an atmospheric pressure.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have been obvious to have modified the system of US '220 to use an annealing chamber in the system as taught by Ritzdorf et al. because using an annealing chamber provides more uniform plated products having less defects as a result of annealing.

Regarding claim 4, Ritzdorf et al. teach that the flow rate of the coolant liquid used to control the temperature in the annealing chamber is one of the components controlled by a controller **580** in the system (col. 13, lines 20-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of US '220 to use a controller as taught by Ritzdorf et al. because the use of a controller automates would automate the

system and provide a more efficient and accurate control of the components of the system.

21. Claims 1, 4, 9-11, 19-25, 29-33, 36, 38-41, 44, 45, 50-56, 63, 64, 66 and 67 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-35 of copending Application No. 09/867,780. Although the conflicting claims are not identical, they are not patentably distinct from each other because they claim the same structural limitations. (Note: copending Application No. 09/867,780 has been published as US 2002/0029961 A1.)

Regarding claims 1, 11, 20, 21, 23, 25, 36, 38, 50, 51, 52, 54, 55, 63, 64 and 67, App. '780 claims an electrochemical deposition system comprising a mainframe having a mainframe transfer robot, a loading station, one or more processing cells connected to an electrolyte supply, a spin-rinse-dry station and a thermal anneal chamber (claims 1-4).

Regarding claim 4, App. '780 claims a system controller for controlling an electrodeposition process (claim 2).

Regarding claims 9, 10, 21, 22, 39, 40, 44, 45 and 56, App. '780 claims one or more wafer cassette receiving areas, one or more loading station wafer transfer robots and a wafer orientor (claim 5).

Regarding claims 19, 32 and 53, the word "rapid" is a relative term and the thermal annealing chamber claimed by App. '780 could be a "rapid" thermal annealing chamber in comparison to another chamber.

Regarding claims 29 and 30, App. '780 claims the mainframe wafer transfer robot comprising a plurality of robot arms (claim 6).

Regarding claim 31, each of the robot arms comprises a flipper robot (claim 7).

Regarding claims 33, 41 and 66, App. '780 claims an electrolyte supply fluidly connected to the processing cells (claim 1).

The system of App. '780 differs from the instant invention because App. '780 does not disclose having the annealing chamber and the loading station robots in the same embodiment, the robot having a robot arm for each of the electrochemical deposition cells, as recited in claim 30, and some of the positional relationships between some of the structural features, such as the substrate rinse and dry station positioned to separate the substrate loading station from the mainframe, as recited in claim 50, and the substrate rinse and dry station separates wet processing components of the system from dry processing components of the system, as recited in claim 51.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of App. '780 to use an annealing chamber and loading station transfer robots in the same embodiment because one skilled in the art would have expected to achieve the benefits of the individual features, such as the ability to anneal the wafers and the automation provided by the use of robots, in a single unitary system.

Regarding claim 30, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the robot of App. '780 to use a robot arm for each cell because using more robot arms allows for quicker

movement of wafers through the system, which would increase the overall throughput efficiency of the system.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the position of the stations claimed in App. '780 because the rearrangement of structural parts merely creates a functionally equivalent device.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

22. Claims 21-28, 32-34, 36, 39 and 42-47 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 6,267,853 in view of Hongo et al. (U.S. Pat. No. 6,294,059).

US '853 claims a system having the limitations recited in claims 1, 4, 11, 19, 20, 38, 41, 50-56 and 63-67 of the instant invention, as explained above in section 19.

Regarding claims 33-35, US '853 further claims an electrolyte supply comprising a plurality of tanks, filters and an analyzer (claim 8).

The system of US '853 differs from the instant invention because US '853 does not disclose the following:

a. Loading station robots, as recited in claims 21, 39, 40, 44 and 45;

b. Cassette receiving areas, as recited in claims 22, 39 and 40;

c. At least one wafer orientor, as recited in claim 22;

d. At least two electrochemical deposition cells disposed on both of two opposing sides of the mainframe, wherein the mainframe transfer robot is disposed between the two sides, as recited in claims 26-28; and

e. A pass-through cassette, as recited in claims 42, 43, 46 and 47.

Regarding claims 21, 39, 44 and 45, Hongo et al. discloses a similar integrated system for electroplating integrated circuits. In an embodiment shown in Figure 7, the system comprises a mainframe having a mainframe transfer robot disposed therein, a loading station **20** serviced by another transfer robot **43**, one or more processing stations comprising a plurality of plating cells **32**, and post-deposition treatment chambers **40** in the form of cleaning and drying units **41** and **42** (col. 9, line 43 to col. 12, line 23). In another embodiment shown in Figure 11, the system comprises a mainframe **110** having a mainframe wafer transfer robot **162** disposed therein, a loading station **167** having a transfer unit with a grip hand (loading station robot) **161**, one or more processing stations comprising a plurality of plating cells (electrochemical deposition cells) **119** and a plurality of post deposition treatment chambers in the form of water cleaning and drying units **160** (col. 12, line 24 to col. 14, line 16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of US '853 to use loading station robots as taught by Hongo et al. because using loading station robots automates the loading and unloading of the wafers in the system, increasing the efficiency of the apparatus.

Regarding claims 21, 22 and 39, Hongo et al. also disclose the use of cassette receiving areas for accommodating the wafers and unloading and loading units **20a** and **20b** which orient the wafers (fig. 7; col. 10, lines 17-20). Cassettes are known in the art of wafer processing to hold a plurality of wafers for processing.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of US '853 to use one or more wafer cassette receiving areas as taught by Hongo et al. because the use of cassettes allows a plurality of wafers to be held for processing, increasing the efficiency of the operation.

Regarding claims 26, 27, 28 and 45, US '853 claims one or more processing cells (claim 1). Hongo et al. disclose a system shown in Figure 11, which comprises a pretreatment cell **118** and three plating cells **119** disposed on each of two opposing sides, wherein the mainframe wafer transfer robot **162** is disposed between the two sides (fig. 11; col. 12, lines 35-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used multiple electrochemical deposition cells in the system of US '853 to use at least two electrochemical deposition cells on each of two opposing sides as shown by Hongo et al. because using multiple deposition cells increases the number of wafers that can be plated at one time.

Regarding claims 42, 43, 46 and 47, Hongo et al. disclose the use of cassettes for transporting the wafers and also discloses a partition **21** for separating the loading and unloading area **20** and the cleaning and drying area **40** and a partition **23** disposed between the cleaning and drying area **40** and the plating area **30** (col. 9, lines 43-67). The partitions **21** and **23** have passages for transferring the wafers between the different stations and also comprise shutters **22** and **24** for opening and closing the passages between the stations (col. 9, lines 57-67). This passage system is equivalent to the pass-through cassette system disclosed and claimed in the instant claims, and it allows the different stations to be independently supplied with discharge air (col. 9, lines 57-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of US '853 to use a pass-through system as taught by Hongo et al. because the pass-through system allows the separation of the different stations and the ability to independently supply the stations with discharge air.

23. Claims 21-31 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 6,258,220 in view of Hongo et al. (U.S. Pat. No. 6,294,059).

Regarding claim 21, US '220 claims an electrochemical deposition system comprising a mainframe with a mainframe wafer transfer robot, a loading station, and one or more processing cells provided with electrolyte from an electrolyte supply (claims

1-3). The processing cell is fed with an electrolyte is connected to an anode and a cathode (claim 3), which makes the process cell capable of being used as an electrochemical deposition cell.

Regarding claims 29 and 30, US '220 claims the mainframe wafer transfer robot comprises a plurality of individually operated robot arms (claim 1).

Regarding claim 31, the system of US '220 each of the robot arms comprises a flipper arm (claim 2).

The system of US '220 differs from the instant invention because US '220 does not claim the following:

a. One or more post deposition treatment chambers, as recited in claim 21;

b. Cassette receiving areas, as recited in claim 22;

c. At least one wafer orientor, as recited in claim 22;

d. One or more spin-rinse-dry modules, as recited in claims 23 and 25;

e. At least two electrochemical deposition cells disposed on both of two opposing sides of the mainframe, wherein the mainframe transfer robot is disposed between the two sides, as recited in claims 26-28; and

f. The mainframe wafer transfer robot has a robot arm for each of the electrochemical deposition cells, as recited in claim 30.

Regarding claims 21, 23 and 25, Hongo et al. discloses a similar integrated system for electroplating integrated circuits. In an embodiment shown in Figure 7, the system comprises a mainframe having a mainframe transfer robot disposed therein, a

loading station **20** serviced by another transfer robot **43**, one or more processing stations comprising a plurality of plating cells **32**, and post-deposition treatment chambers **40** in the form of cleaning and drying units **41** and **42** (col. 9, line 43 to col. 12, line 23). In another embodiment shown in Figure 11, the system comprises a mainframe **110** having a mainframe wafer transfer robot **162** disposed therein, a loading station **167** having a transfer unit with a grip hand (loading station robot) **161**, one or more processing stations comprising a plurality of plating cells (electrochemical deposition cells) **119** and a plurality of post deposition treatment chambers in the form of water cleaning and drying units **160** (col. 12, line 24 to col. 14, line 16). Hongo et al. also disclose, "spinning a semiconductor wafer at a high speed to dehydrate and dry it" (col. 10, lines 27-28).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified system of US '220 with a rinse-spin-dry unit as taught by Hongo et al. because a rinse-spin-dry unit cleans and dries the wafers, removing contaminants and preparing them for further processing or packaging.

Regarding claims 21 and 22, Hongo et al. also disclose the use of cassette receiving areas for accommodating the wafers and unloading and loading units **20a** and **20b** which orient the wafers (fig. 7; col. 10, lines 17-20). Cassettes are known in the art of wafer processing to hold a plurality of wafers for processing.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Ritzdorf et al. to use one or more

wafer cassette receiving areas as taught by Hongo et al. because the use of cassettes allows a plurality of wafers to be held for processing, increasing the efficiency of the operation.

Regarding claims 26-28, US '220 claims a system comprising one or more processing cells (claim 1). Hongo et al. disclose a system shown in Figure 11, which comprises a pretreatment cell **118** and three plating cells **119** disposed on each of two opposing sides, wherein the mainframe wafer transfer robot **162** is disposed between the two sides (fig. 11; col. 12, lines 35-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used multiple electrochemical deposition cells in the system of Ritzdorf et al. to use at least two electrochemical deposition cells on each of two opposing sides as shown by Hongo et al. because using multiple deposition cells increases the number of wafers that can be plated at one time.

Regarding claim 30, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the mainframe wafer transport robot in the system of US '220 to use an arm for each electrochemical deposition cell because using more arms increases the number of wafers that can be transferred at one time as well as decreases the average time required to replace a wafer in a plating cell.

Response to Arguments

24. Applicant's arguments with respect to claims 1-11 and 19-47 have been considered but are moot in view of the new ground(s) of rejection.

25. Regarding Applicant's arguments, the arguments were based on the motivation to combine the reference of Maydan et al., which is directed towards an integrated deposition system, wherein the methods of sputtering, CVD and PVD were the only examples of methods disclosed. While such methods are known to be similar ways of fabricating wafers, the rejection was withdrawn in favor of the rejections applied above. Both Hongo et al. and Ritzdorf et al. disclose similar integrated systems for plating wafers comprising a plurality of processing cells, transfer robots, and other features claimed in the instant application.

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

blm
April 11, 2003

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